

*Journal of a trip through Kunawur, Hungrung, and Spiti, undertaken in the year 1838, under the patronage of the Asiatic Society of Bengal, for the purpose of determining the geological formation of those districts.—By THOMAS HUTTON, Lieut., 37th Regt. N. I. Assistant Surveyor to the Agra Division.*

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## P A R T II.

On the 15th of June, the thermometer, at sunrise, indicated 47°, at an elevation of 10,522 feet above the sea. This morning we started betimes, and once more proceeded in search of the habitations of men.

About a quarter of a mile from camp, we had to cross a torrent, whose waters were luckily at this early hour of the day, reduced by the frosts on the heights from which it came, but yet its force was such, that it required some care and exertion of strength, to enable a man to stem it safely. Seeing me make preparations to wade through it with the rest, a couple of sturdy Tartars at once came forward, and while the one stooped down and offered me his back, the other, before I could say a word, had bound me to it with his red sash, like any other load, and away they trudged into the stream, where after several awkward stumbles, caused as much by their laughter at my apparent uneasiness as from the violence of the stream, they gained the opposite bank in safety, and released me from bondage. They then gave assistance to several of the loaded people, and seemed to care little about the coldness of the stream, although its temperature was 36°, and the hour of the morning, seven.

The streams, whose waters are supplied from the melting of the snows above, are often only passable in the early hours of the day, when their sources are still bound up by the frosts of the preceding night, swelling so rapidly towards the afternoon, under the influence of the sun's rays, that neither man nor beast can stem them. I saw an instance of this in a stream at Hungo, where at four o'clock in the afternoon its breadth was upwards of twenty feet, while at seven next morning, when I crossed it, it was, though still strong and violent, barely eight feet across.

While on the subject of rivers, it may not be amiss to notice an error which Dr. Gordon has inadvertently fallen into. In his account of a voyage down the Indus to Bombay, he attributes the small quantity of water observable in the Sutledge and Garra, during the winter months, to have been occasioned by the failure of the rains in the hills, during the preceding season.

The fact is, that these rivers are not at all dependent on the rains for their supplies, but like all those which have their sources in the hills, are fed, during winter, from the snows alone; and the small quantity of water remarked by Dr. Gordon, was occasioned by the severity of the frosts in the upper hills, which had bound up their sources in ice.

The rivers of the plains are most swollen during the months of June, July, August, and September, because at that season the frosts on the snowy ranges are less severe, and the snow melts away beneath the influence of the summer heats from all the inferior elevations, supplying the rivers with abundance of water, which again gradually decrease in violence as fresh autumnal frosts and falls of snow occur.

This too is annually proved to be the fact by the rapid rise in all these rivers during the hot months, before the rainy season has commenced.

As the rivers are most swollen during the prevalence of the monsoon, it may appear to the inhabitants of the plains that the rise of the waters is to be wholly attributed to the rainy season, and that the volume of their waters diminishes as the rains gradually die away. This, however, would prove a very erroneous idea, for although undoubtedly rivers after *coming within* the influence of the monsoon, receive immense additions from the drainage of the surrounding country, yet it must be remembered that they are not at all affected by the rains through a great portion of their passage through the mountains, and especially in those regions where they take their rise.

Thus they could merely receive those additions *during the prevalence* of the monsoon, and whether the rainy season had been heavy, or the reverse, it would exercise no influence over the rivers during the winter months, or in any way affect the quantity of water at that season.

The sources of all the larger rivers from these hills are situated far beyond the influence of the periodical rains, and consequently the total failure of the monsoon could but affect them during that particular

season, and then only in those parts within its influence. Did these rivers owe their origin to the rains, the remark would have been correct enough, but as they derive their source from lakes, and are fed by snow waters till they have passed through the outer barriers of the snowy range, it must be apparent that the shallowness of their streams in winter is owing solely to the severity of the frosts above.

The volume of such rivers during winter, even many hundreds of miles from their sources, will always furnish a sure, and never-failing index to the rigour or mildness of the seasons in the mountain tracts from which they take their rise; for if the winter be mild above, the rivers will possess a more abundant supply than when the contrary is the case, and the changes too, which take place above, such as frosts and thaws, will always be marked by corresponding changes in the volume of the rivers.

An instance of this kind fell under my own observation during the passage of the Indus, in January 1839, near Shikarpore, by His Majesty Shah Shooja. During the few days occupied in crossing his troops, the river fell amazingly, so as to lay bare some sand banks which had the day previous been deeply covered with water. This was of course occasioned by severe frosts in the regions of the Himālaya through which the Indus and its various tributaries flow, and shortly after, I received letters from the hills, which stated that the winter in the higher tracts had been severe, and that much snow had fallen. The subsequent melting of this snow a little later in the spring, again caused such a rapid rise in the waters of the river, as to add greatly to the labours and anxiety of the engineers who were constructing a bridge of boats at Bukkur for the passage of the army of the Indus, for the swell of the waters was so great as to threaten the destruction of the bridge, by sweeping away the boats.

In the stream we had just waded through, a man and his pony last year in attempting to ford it at midday, were swept down by the force of the current, and hurried into the Spiti, where they were both lost in the rush of waters.

Our path from this treacherous torrent continued tolerably level, along the side of the river; one while broad and good, as it led us across the alluvial flats, and again affording scarcely room for the foot of any living creature, save the sheep and goats which had formed it.

About half way between our last encampment and the village of Larree, to which we were journeying, stands Soomra, situated on the right bank of the river, and within the district of Hungrung; it is built on one of the accumulations of alluvion so often alluded to; and in which the valley abounds.

Many of its fields are now uncultivated, and the village itself, though appearing to possess many houses, is occupied by *three* families only, each consisting of from six to eight souls. There were lately two other families residing here, but they could not rear sufficient to recompense them for their labour, and have emigrated to some other place.

Near this we fell in with a large flock of beautiful sheep from Choomoortee, which was travelling to Dunkur for grain. The sheep are driven from village to village with the wool on, and as the required quantity is cut from their backs, they are laden with the grain which is received in exchange; and which, when the fleece is all disposed of, is carried up into Chinese Tartary and sold at a profitable rate.

The wool of the Choomoortee breed is very fine, and much longer than that of the low country sheep; it is therefore in much repute, and purchased for the purpose of making birmore, sooklat, and blankets.

The wool called "pushm," from which shawls and pushmeenas (shawl stuffs) are made, is entirely obtained from a breed of goats resembling those to which the name of "Cashmere," has been applied; they are often four or five horned, and do not thrive below Pooee and Soongnum in Kunawur, both because they are unable to bear any degree of heat, and on account of the humidity of the lower climates. Their true habitat is in the higher and remoter regions of Chinese Tartary, where they attain to their greatest perfection.

The pushm is a remarkably fine wool, very silky and soft to the feel, and grows at the roots of the long hair with which the animal is clothed. It is obtained in the summer months by *shearing* the goats, in the same manner as sheep, and afterwards separated from the hair, which is not thrown away, but reserved for the purpose of making ropes, as hemp is unknown in these higher tracts. This wool is afterwards brought to the lower hills for sale, and forms one of the chief exports from Tartary. The pushmeenas, which are manufactured from it, are chiefly from Rampore and Cashmere.

The skins of this breed are also used by the Tartars as an article of dress for the winter, and form with their long hair and thick pushm, a

warm and comfortable garment, which is worn with the hair inwards, in the manner of a cloak.

A fine pushm is also obtained from the large breed of Tartar dogs, usually termed "Thibet mastiffs" (*Canis Molossus, var Thebitanus*), but it is not in sufficient quantities to form an article of commerce, although it is said to be far superior in quality to that of the goats.

Captain Herbert remarks, that, "the Government has not succeeded in introducing the shawl goat either into Hungprung or Kunawur. This as regards the former district is a mistake, for although they will not thrive in the more humid climate of Kunawur, they abound in Hungprung and in Spiti, although the breed is not reputed so good or productive of wool, as that of higher Tartar districts.

This third march at length brought us to an inhabited place, and there we halted for the day. The village of Larree is situated on the left bank of the Spiti, on a deposit of alluvial soils. It is nevertheless a poor place, and contains but three families, consisting of about twenty souls. There are some good flocks and herds of yáks belonging to this village, which however were all away on the heights at graze, the neighbourhood of Larree producing nothing in the shape of pasture. Here growing in the fields among the grain, were many plants of a very pretty and delicate iris, which I had observed also at Chango, in Hungprung; it forms the third species I have met with in my trip. The flowers are of a pale blue, and the petals delicately veined with a darker tint; there was also a white variety of the same, occurring in some abundance. Another very beautiful flower was also seen spreading along the ground in stony or otherwise barren places, and bearing a large white blossom; it occurs throughout Tartary, and in some of the higher parts of Kunawur, and in the former country is called "Kābrā."

On our arrival at this village the people refused to have any thing to say to us, and to our demand of grain, &c., they declared they possessed none, as in the preceding year the village had been plundered by Runjeet's troops, and the present crop was not yet ripe. This my guide declared to be a lie, as he knew they had plenty, but were fearful that we should help ourselves without giving payment for what we took.

After a long parley they were induced to bring a small quantity of flour, which they offered for sale at four seers for the rupee. This,

I at once refused to take at such a rate, as I knew they were selling it much cheaper among themselves, and I had purchased it at Chango at twelve seers.

I therefore opened my own store and supplied my people for the day, but even the knowledge that we could do without their grain failed to reduce its price. Nor was I more fortunate in obtaining a sheep for my own use; for they would not produce a fat or a healthy one, but brought me an *old ewe*, which looked like the mother of the flock, and declining to buy her, I was necessitated to take a two year old he-goat, or to go without my dinner.

Leaving Larree on the 16th of June, I continued my route towards Dunkur. A short walk, during which we had to ford two streams, brought us to the village of Tābo, which is chiefly inhabited by Lamas, who cultivate the soil, and attend also upon the takoordwara, or temple, which is a large building, and ornamented inside with a number of earthen figures of their gods, by no means badly executed. These are arranged along the walls of the principal rooms, which are also painted with many grotesque figures and flowers connected with their mythology.

Last year when the Ladak rajah was obliged to seek protection in Bussaher from Runjeet's troops, the figures in this temple were sadly mutilated. The houses of the Lamas were pulled down, and the noses and hands of the idols were cut off and thrown into the river. This outrage is generally attributed by the people to their invaders, but in reality it seems that it was perpetrated by the followers of the Ladak rajah themselves, who when deserted by their master, thought to ingratiate themselves with their conquerors, by assuming the same form of turban, and mutilating the gods of their own countrymen. If asked who defaced the images, the Lamas always accuse the "Singa," as they term the Seikhs, but when questioned as to the numbers who invaded them, all accounts agree in stating *six* or *seven* men, and the rest were the adherents of the Ladak rajah. These fellows also, finding the opportunity favourable, and knowing that the blame would be laid upon others, plundered every village in Spiti, and levied a fine of fifteen rupees on each, with a threat that they would repeat the visit. Every excess is however attributed to the Seikhs.

From Tābo we proceeded towards Pokh, or Pokhsa, by a road which

one while led us along the margin of the Spiti, and at another, up over crumbling rocks of slate which overhung the river. These heights were sometimes of a frightfully dangerous nature, the soil being so loose and crumbling, that often the pathway had slipped down altogether into the waters below, and left a gap over which we were obliged to pass by making holes for our feet, while we literally overhung the roaring torrent at a height which made one shudder to behold. I am quite sure that had I been left to myself, I should have fallen from the very care I took to avoid it, and from the mere fear lest I *should* fall; but the people about me were well used to such kind of places, and seemed to regard them no more than would a goat or a sheep, and as one gave me a hand to steady me forward, and another kept a hand at my back to reassure me, I managed to get across well enough, although I should previously have been very much inclined to say that the place was impracticable. So much however does habit hide the danger of any place, that on my return I walked along it without assistance, and without the least idea of falling, though the coolies preferred sliding down an easier part of the hill, and walking knee-deep in water.

A far more dangerous passage than this, was wading along the margin of the river Spiti, at a place where its waters had swallowed up the road. Descending gradually from the heights already mentioned, the pathway lies along the margin of the stream, at a place where the rocky mountain is too precipitous to be scaled. When the river is unswollen by the melting of the snows the road thus runs between it and the mural cliff which rises from the bank. Now, however, at this late period the waters washed against the cliff itself, and left no passage for about 200 feet, but through the stream. Taking hold of each other's clothes with one hand, and pressing the other firmly against the rock, we slowly and cautiously entered the rapid stream, groping along the bank up to our waists in water, whose temperature was any thing but hot, and whose force was such, that had any one lost his footing among the stones and fallen, he would inevitably have been carried down by the current, and most probably drowned. The distance, however, was not very great, and we reached the road again in safety, where it once more emerged from the river's bed. Luckily this cold bath occurred but a short distance from our journey's end, and hastening on we soon arrived at Pokh, where we were glad to strip off our dripping garments and warm ourselves at a blazing fire in the open air.

Pokh is a small and shabby looking village, and the houses, like all those of Hungrung and Spiti, are built partly of stone and partly of mud, or unbaked bricks, that is, of stone for the foundation, and bricks above; the walls are usually daubed over with whitewash, which, is obtained from beds of friable gypsum occurring among the clays at the lower end of the valley; the windows and doors are small, particularly the former, which are often not above eighteen inches square, and have a red frame or border. As usual there are no trees, except a few poplars and willows on the margin of a stream. There are, however some rose bushes and dwarf cedars in a glen behind the village.

Opposite Pokh, on the right bank of the river, is a large patch of cultivation, and a few houses, called "Pokh-mä-rüng," although the two are usually known under one name. The cultivation indeed belongs to the inhabitants of Pokh, and a communication is kept up by means of a joola, or number of ropes stretched across the river, on which passengers slide over. This joola had unfortunately given way just before my arrival, and two or three people who had gone over, were consequently obliged to remain on the opposite bank, for to swim the river at this season was impossible. The ropes used in the construction of this dangerous bridge, if such it can be called, are made of willow twigs twisted strongly together, and about the thickness of a man's wrist; these are sometimes four or five in number, and are fastened on either bank to an upright post driven into the ground. From these ropes a loop descends, in which the person sits, and pulls himself along. Many fruitless attempts were made to convey a new rope across the river, by fastening a stone to a long string, and endeavouring to throw it over to the other side, but not one man in the village could succeed, for the stone invariably fell into the middle of the stream. The Churriah and Tartars who were with me also tried their best, but with the same want of success. A bow and arrows were then resorted to, but they also failed to reach the bank, and the experiment was abandoned. The Mookiah of the village then said he would furnish a yāk, to whose tail one end of the rope was to be fastened, and the animal driven into the stream; if he succeeded in reaching the opposite shore, well and good; but if, as was most probable, the beast failed, and was drowned, he would abide the loss. As the yāk had to be brought from the heights where he was at graze with the herd, I did not see the experiment tried, but on my return

from Dunkur some days afterwards, the ropes were still lying at Pokh, and no joola had been conveyed across, so I conclude that the experiment had either failed, or had not been resorted to, although I forgot to make the inquiry.

On the heights, in the neighbourhood of Pokh and Larree, the wild sheep is said to abound, but there were no hunters in the villages to send in quest of them, and the only one of whom Soomra could lately boast, was now no more.

In the past winter he had described a flock upon the heights behind his village, at no great distance, and seizing his matchlock had started for the chase which was destined to be his last. Night came and passed ; the day succeeded and passed also, yet no hunter returned ; and at last alarmed at his prolonged absence, his son started in search of him, but all in vain. The traces of his footsteps were followed for some distance up the mountain's side, when, as if the hunter had been spirited away, or vanished into air, they suddenly ceased at a large fresh field of broken snow. Days and weeks passed on, and the wonderful occurrence of his disappearance had begun to be forgotten, when a sudden thaw took place, and his body was seen yet fresh among the snows, at the place where his footsteps had ceased. His gun was in his hand, and he lay as if in a sound sleep ; but he was cold and stiff, for he "slept the sleep that knows no waking ;" he had been smothered in an avalanche from the heights above him. His were the fields at Soomra which we saw lying barren and neglected, for his family had left the place.

Of birds, we saw but few, and they were chiefly the raven, and two species of chough, or red-legged crows. Chikores were abundant, and the shrill whistle of the Bhair, or Ladak partridge, was occasionally heard high up among the snows. Of the smaller birds, none but the hardy little sparrow was seen, and I could not help thinking that he, like the sons of Britain, appears in every corner of the earth.

Leaving Pokh at sunrise on the morning of the 17th of June, we travelled for about three miles along a flat and extensive plain, strewed thickly over with boulders of every size. From this we ascended a short but steep hill, in a N.W.b.W. direction, the river taking a somewhat sudden turn, forming an elbow, on the outside of which stands the village of Mānēss below the Mānērūng pass, a difficult and

dangerous road, which leads from Spiti into Kunawur, about seventeen miles from Soongnum.

From this turn the bed of the Spiti becomes much broader, and numerous sand banks, or islands, are seen, some bare and barren, others producing shrubs of the barberry, causing the river to divide into many channels, which gives a pleasing effect to the scene. A walk of four miles along the hill side, brought us at length to our encampment beneath the fort of Dunkur.

The fort and village of Dunkur are built high above the Spiti, among the ragged spires which crown the time-worn rocks that form its bank. This rock is inaccessible on every side, with the exception of that by which it is connected with the main range of hills, of which indeed it forms a spur, or offshoot towards the river. A stream descends on one side of it from the heights, and in former days a covered way existed from the fort to its banks, by which the garrison were enable to obtain water unperceived by the enemy; this has however long since fallen into decay, and its ruins now alone serve to mark the line along which it formerly descended. As a place of strength, Dunkur was well calculated to hold out against the rude bow and arrow warfare, as once practised in these high tracts, but as a check to troops armed in the modern style, even without guns, it is insignificance itself.

The only spot I could find to encamp on here, was on a small patch of grass, immediately at the foot of the cliff on whose crest the fort was perched, and which towered up some hundred feet above us. Near us were encamped a party of shepherds from Choomoortee, who had just arrived to sell their wool and purchase grain. It is the custom among these people to give an order, while the crops are yet green and on the ground, for any amount of grain they may require, which when the crop is ripe, is stored up by the cultivator until the summer of the ensuing year, when the shepherd arrives with his flock, gives the wool in exchange, and receives his grain, which he puts into small bags, brought with him for that purpose, and drives his flock thus laden back into Chinese Tartary.

In the evening when the flock was brought back from pasture, I had an opportunity of witnessing the mode of shearing. The sheep whose fleece had been selected, were caught, thrown upon one side, and their legs bound together, when a shepherd having sharpened the long knife

which he carries at his waist, proceeded with expedition to strip off the wool, singing all the time, and joking with his comrades, who were likewise busily engaged around him. In a very short time the whole of the flock, save a few thin sheep, were sheared, and the wool being twisted into bundles, was carried up to the fort, to which also the next morning the sheep were driven, when having each received a load of from ten to twenty seers, they descended and took the road back to Choomoortee.

Soon after we had encamped, a scuffle took place between these shepherds and my Tartar guide from Leeo, and the latter at last came into camp with a fine fat looking sheep. I was at first inclined to look upon this as a daring highway robbery, but it soon appeared that in the previous year the guide had advanced the sum of five rupees to these shepherds for pushmeena wool, which they were to bring down for him, when they descended to the Rampore fair. This wool had been supplied in part only, and two rupees were consequently still due, for which the Tartar fearing lest he should be cheated, had seized the sheep in question. As the animal however with its fleece was worth more than double the sum required, the shepherds came and entered into an explanation, which seemed satisfactory to both parties, as the animal was restored. I laughed at the guide for being so easily pacified, and told him he would never get his money or his wool, but he replied quite confidently, that the shepherds had pledged their word, and therefore there was no fear, as a Chinese Tartar never broke his promise.

With the wool on these sheep are remarkably handsome animals, and have somewhat the appearance of the large English breeds, but when shorn, they present such a different picture with their long thin limbs and narrow carcase, that one would not know them to be the same animals.

They differ much, also, from the breeds of the lower hills; standing higher on their legs, and the horns wanting that solidity and strength which those of Kunawur possess. There is generally a black longitudinal stripe down the middle of the horn. I was anxious to purchase one or two of this breed, but the people very honestly assured me that they would not live below, on account of the dampness of the climate.

Most of these sheep were formerly purchased by the British Government by an agent appointed for that purpose at Kotgurh, but

from some cause or other it was not found to answer, and the speculation as abandoned. I have been told that a difficulty existed in inducing the Tartars to sell to the British agent, they preferring to trade with the people of the higher tracts.

Whatever might have been the case in those days I know not, but at present I can confidently say, that the Tartars would gladly supply the Government with any amount they might require. They will not, it is true, bring their flocks down, because the climate is unfavourable to them, and also because at the season of the Rampore fair the sheep which are sheared early in summer do not possess a full fleece. The wool however which is cut in the beginning of the year, is sold by the Chinese shepherds to the Tartars of Hungrung and Spiti, and the traders from Kunawur, and it is these people who would supply the market if a demand were made for the wool, and who could procure it from above, in any quantity they chose to pay for.

The failure is far more likely to have been caused by the avarice of the low country traders, who purchasing the wool cheaply above, and perhaps, as is often the case, intermixed with hairs,\* dispose of it again at a rate so exorbitant as to prevent its yielding a remunerating price in the home markets of Europe.

Had the agent instead of remaining in the lower hills paid an annual visit to Tartary, and purchased his wool directly from the shepherds themselves, instead of taking it from the hands of the traders, he would not only have procured a better, but a cheaper article.

In case this wool should ever again become an article of speculation either to the Government or to individual enterprise, it may not be considered superfluous to offer here a few remarks on the method to be adopted in procuring it.

In the first place I would warn the speculator against trusting to native agents, but would recommend him to make his purchases himself. He would probably not be allowed to enter the country under the protection of China, but he might with ease and safety every summer repair to Hungrung or to Spiti, where the Chinese shepherds would not fail to meet him by appointment, and furnish any quantity of wool he might have ordered in the preceding year.

\* Since this was written, I have been informed that such was actually the case, and that the wool was found to be so intimately mixed up with hairs as to render it unserviceable, without incurring a ruinous expense in cleaning it!!

It would be necessary therefore for him to make one trip in order to see the shepherds, and enter into arrangements with them for a supply to be delivered in the following summer at any Tartar station they might decide upon, and also to ascertain *what goods* they would require in return ; for money, I imagine, would be held in less estimation than saleable and useful commodities.

Having made his arrangements, he would again in the following summer have to repair to the appointed place, where he would find the shepherds (as I did at Dunkur) ready with their flocks, and he would thus be able to select his own fleece, and see it shorn before him.

It would therefore be his own fault if any hair or extraneous matter were received with it. Of this, however, as long as the wool did not pass through the hands of agents, there would be no fear, for it is those gentry who adulterate the article in order to increase its bulk, and so derive from the inexperienced trader a greater profit.

The next point to be considered, is the carriage of the wool to the lower hills, and this indeed would be the chief expense.

The method to be adopted, must be the same as that resorted to by the hill people themselves, which is, to load it on the backs of sheep and goats.

For this purpose it would be necessary to purchase a large flock, which during the winter season would find an abundant pasture in the lower tracts, or even in the plains, and in the summer and rainy season would be roaming over the grassy tracts of the upper hills.

The first cost of these animals would be the chief expense, but even this would in the course of one or two seasons repay the outlay by the kids and lambs which would be produced, while something also would be recovered by the sale of the wool and ghee obtainable from the flock.

With his flock therefore the speculator would transport to the Tartar districts, flour, grain, salt, iron, ghee, butter, cloth, sugar, and other articles in demand among the people, and for which, if his purchases were judiciously made either in the plains or lower hills, he might not uncommonly receive cent per cent on his outlay.

The profit thus made upon his own merchandise, would not only more than pay for his wool, but would even nearly, if not altogether, defray the expense of transporting it to the plains, and thus indeed when once the prime cost of his flock had been realised, the speculator might be said to receive his wool for nothing. From the profit arising

on his merchandise also, he would be enabled, should competition be feared from the present traders, to afford to take the wool at a higher rate than they can afford to do, and thus he could effectually drive them from the market, and establish a monopoly.

The experiment is at all events worthy of another trial, since the former failure is entirely to be attributed to the inexperience of the agent, and the rascality of the traders who supplied him.

On the following morning, having left behind me four people to receive supplies, I marched on towards Leedung, crossing the Lingtee river not far from Dunkur. A walk of about seven miles brought us to a miserable village of a few huts, which the guide told me was Leedung, so we halted for the night. After my tent was pitched, and the people had eaten their dinners, we all proceeded in search of fossils in the ravines and water-courses which came down from the heights along the river's bank. Here, however, nothing worth the trouble was found, but as I was searching at some distance from the rest of the party, a lad, whom I recognised as having been with the Dunkur commandant, came cautiously towards me, making signs that there was nothing to be had below, and then pointing to the palm of his hand, and looking towards the summit of the range of hills behind his village, he gave me to understand that for a reward he would lead me up the pass, where I should find something worth having. To this I readily agreed, and at once gave him a small red necklace to make the compact binding. He then in broken Hindostanee, and by signs, told me that I must keep to myself his having given this information, as the killadar had given orders that no one should show me the path up the heights. I afterwards discovered that he was an arrant cheat, and had taken me in with his story, as the killadar only alluded to the passes into Ladak ; however I of course promised silence, and when he had pointed out the road, we parted, and I returned to my tent, when I gave orders to the coolies to be ready to accompany me up the heights the next morning.

About a quarter of a mile from Leedung is another small village called Larra. In speaking of either place the Tartars invariably apply the names of both, as Larra-Leedung. This custom is not however peculiar to Spiti, but prevails also in Kunawur when two villages are near each other ; thus in Spiti we find Larra-Leedung and Chism-Kéburr to be applied to the villages of Larra and Lee-

dung, and of Chism and Kēburr, the two last being also on different banks of the river; and in Kunawur the names of Dabling-Doobling are always taken together, though they belong to different villages.

The crops at Leedung were very poor and backward, and it is a great chance if they ripened before the snow fell again; the cultivation higher up the river too, is seldom ready for the reaper before the end of September, and is often wholly destroyed by an early fall of snow.

In the morning I started with about a dozen people up the mountain path, and after a toilsome ascent of 3,000 feet, reached the pass above Leedung. Beyond this was stretched a wide and undulating plain, shelving gradually to a stream far away in the distance; the pass and all the neighbouring hills were yet covered deeply in some places with snow, and the whole scene was one of cold and dreary solitude, with not a tree to intercept the view, nor ought of vegetation but the furze.

Beyond the shelving tract of land which spread down from the ghat, arose again a mighty snow-clad range of hills lifting its hoary head to an elevation varying from fifteen to twenty thousand feet above the sea. Here on the summit of the pass, which is 15,200 feet, an extensive bed of decomposing shale gave a black and charred appearance to the soil, while high on either hand rose mural cliffs of brimstone interstratified with sandstones of different textures; these were splitting by the action of the frost, and falling in heavy masses down the ghat, where low down they formed vast beds of broken fragments of every size. Crossing this pass and descending along the shelving plain, we came, to my surprise, suddenly upon a village situated in the hollow formed by the undulating and blackened hillocks of shale which rose in all directions, looking like heaps of coals and cinders. Beyond this, the Tartar lad pointed to some dark ravines, or water-courses, where he said the fossils were to be found. Thither we of course repaired, but though we searched long and closely throughout the day, a few broken and useless specimens of the casts of Ammonites and Belemnites were all that we collected, and after wandering among the snows and swamps and muddy fields, at an elevation of 14,000 feet, from seven in the morning until 5 p. m., I returned weary and disheartened to the pass, from whence we again descended to our camp at Leedung.

Though puzzled to account for my want of success, I had nevertheless seen enough of the formation on the heights to feel convinced

that fossils must exist there, if they were really to be found in the Spiti valley, and I consequently determined to devote another day to a further search. Accordingly on the morrow I broke up my encampment, and repaired to the village we had seen on the heights above Leedung, among the regions of snow. Having now plenty of time to look about me, I commenced a closer search in the bed of a snow stream, which had scooped a narrow channel through the decomposing shales. Here I was soon rejoiced to find that I had at last "hit the nail upon the head," and a large supply of Belemnites rewarded me for wading ankle deep up the chilly stream. Along with these a few broken Ammonites were also found, and a species of bivalve shell, which the Tartars termed "puthur ka muchlee," or fossil fish.

From this place, which was elevated 15,250 feet above the level of the sea, and covered here and there with beds of snow, I proceeded, after several hours search, to the village about a mile farther down, where my tent was pitched and my people had all arrived.

The following day was again devoted to a search for more and better specimens in various directions, but to very little purpose; and seeing now no prospect of obtaining more, and being unable from the depth of snow to search the lake of Chumor-ra-reel, now only three days journey from us, I was reluctantly compelled to give the order to retreat, for our provisions had dwindled to one day's supply, and there was here no prospect of procuring more for love or money.

The village at which we had encamped was called "Gewmil," and had an elevation of 14,104 feet, yet here, in spite of reviewers and reviews, surrounded in the month of June by deep and extensive beds of snow, a fine and healthy tract of cultivation smiled, like "some bright emerald midst the desert waste." At this season, however, the wheat and barley was barely six inches above the ground, and from the elevation of the tract, it seldom ripens before the first days of October. The hills around it on every side are clothed to their summits with the Chinese furze (*Astragalus* of Royle) which notwithstanding the advanced season of the year, had scarcely put forth a single leaf. This backwardness was however somewhat unusual, and was owing to the lateness of the last fall of snow, which throughout the upper parts both of Kunawur and Spiti, had fallen two months later in the season than is generally experienced; so heavy indeed was the snow still lying on many of the higher passes, that it is more than

probable they could not have been free from it, or open to travellers before the fresh autumnal falls occurred.\*

The season of 1837, which in the Provinces, from want of rain, brought sickness and scarcity upon the inhabitants, was also a time of trial and misery to the poor Spiti Tartars, inhabiting the villages beyond the fort of Dunkur. It was, however, not the want, but the excess of rain, a thing so unusual in those parts, which caused the failure of their crops, by rotting them on the ground; and the little that escaped this scourge, and which would eventually have ripened, was cut off so early as the month of August by a heavy fall of snow which crushed and beat down the grain, and rendered it useless. At the time therefore when I visited those parts, so far from being able to furnish me with supplies, the wretched people were actually reduced, like beasts of the field, to seek for herbs and wild roots with which to satisfy the cravings of hunger, and they were rendered almost frantic with delight by the gift of a handful of meal, which, though straitened as we were ourselves, it would have been inhuman to deny them. Many have been obliged to leave their homes and go as labourers to Ladak, who were lately in possession of cultivated lands.

This, it would appear, is by no means an uncommon occurrence in the higher portions of the valley, for the people in speaking of the quantity of grain likely to be gathered from their fields, always put in the proviso, "if the snow does not fall early."

Around the village of Gewmil, many ponds are found for the reception of the snow water, from which the daily quantity requisite for the irrigation of the crops is supplied. On one of these, at this enormous height, were a pair of Brahminee ducks, which had fled from the summer heats of the Gangetic Provinces to revel in the cool and secluded retreats afforded on the snowy heights of Tartary.

Here, too, among the frowning cliffs, the raven and the vulture-eagle were seen, as also the red-legged and yellow-billed choughs.

From one of the peaks, behind this village, which attained the height of 14,714 feet, I beheld the course of the Spiti river, winding its way for miles along the valley, until it was lost in a turn of the mountains. From this spot I looked down upon the village of Larra, whose houses and cultivation showed like mere specks, when seen from a perpendicular height of 2,700 feet.

\* This proved to be the case, as the Tartars could not descend to the Rampore fair.

Viewed from this elevated station also, the majestic grandeur of the neighbouring hills, which enclose the river like two lofty walls, sink into comparative insignificance, and appear with their snow-capped summits like so many glittering pyramids of sugar; yet they attain to an elevation above the sea of seventeen to twenty thousand feet, and their hoary and time-scarred heads are crowned by everlasting and unfading snows.

It had been my earnest wish to cross the mighty Pralassa range of mountains, from whose snows the Spiti river is supplied, and to visit the beautiful and extensive lake of Chummor-ra-reel, of which Gerard speaks, but from the unusual depth of snow over all the passes, I found this to be impossible; for although I had plenty of time before me, and could have waited till the thaws had commenced, yet the chance that before they could be crossed the autumnal falls would again commence, added to the total impossibility of obtaining provisions for my people, rendered it necessary that I should beat a speedy retreat from the inhospitable valley, and thus I was reluctantly obliged to quit the district without having accomplished one of the most wished for objects of my journey.

This lake is said by Gerard to abound with fish, and to be covered in the summer months by flocks of ducks, geese, and other water-fowl, which resort there from the heats of the Provinces. From Puttee Ram and others who have often visited the spot, I heard that its waters were salt, and could not be drank, as they acted like medicine, so that travellers and the wandering Tartar shepherds who sometimes inhabit the borders of the Lake in their black tents of blanket, are obliged to use the water of the snow streams and springs in its neighbourhood.

From these facts an interesting subject of inquiry arises; namely, whence did this Lake, situated at an elevation of at least 16,000 feet above the sea and surrounded by hills, whose summits are usually capped with snow throughout the year, derive the fish with which it is now stocked? Are they identical with the species common to our rivers of the Gangetic Provinces, or are they distinct and peculiar to the Lake itself?

Doubtless there are many who will infer that they are identical with the species of the Provinces, and that the Lake being the summer resort of water-fowl, the ova have been deposited in its waters through their agency. But to this opinion I feel decidedly averse, from the

fact, that such a sudden transfer of the ova of species belonging to hot climates, to the waters of a lake which is elevated so far above the natural abode of the species, and which are often *ice bound* for several months in the year, would render the ova thus transported totally unfruitful; and that the climate of these regions is totally different from that of the plains, is a fact which is fully established by the migration of birds to them during the summer season.

Again, those birds may resort there from the plains of China, as well as from those of Hindooostan, and as it is equally probable that ova would have been brought from both countries, we should find species of fish peculiar to either country, not only being together in the same climate, but in a climate which differs widely from the natural habitat of all the species.

Moreover, I question whether the ova *could* have been brought from the plains of either country, because the birds by whose agency the waters should have been stocked, quit the rivers of the plains, and resort to those high regions in order to *avoid* the hot season in which the ova are *produced*; therefore the ova could not have been brought by them.

If, again, the lake was stocked with fish through the agency of the water fowl which resort to it, how is it that the smaller lakes and ponds have not been similarly stocked also, for both at Nako in Hungrung, and at Gewmil on the heights of Spiti, I observed the Brahminee duck, so common in the plains of India, yet the ponds at those places do not contain a single fish?

But as the birds do not arrive at the lake in question, in the course of one or even two days, but make various halts in their journey from the plains, it is at once apparent, that the undigested ova which they are supposed to have brought with them, should have been voided rather in the ponds of the intermediate stages, than in the waters of these stupendous regions.

But the most decided proof, perhaps, that this lake was not stocked from the rivers of the plains by the agency of birds, exists in the fact that its waters are *salt*, and strongly impregnated with borax; consequently the ova of species adapted for an existence in pure fresh rivers and ponds, could not have been productive in regions and waters decidedly inimical to their constitutions.

The question however, is one of some moment, and worthy of being fully sifted. I am myself inclined to believe, as will be more fully seen

hereafter in my geological notice of the Spiti valley, that those species may be peculiar to the lake or lakes of those lofty regions, and that they date their existence from the period when those waters first became adapted to support the species which now inhabit them, and that date I fix as *posterior* to the Mosaic Deluge, when, as I shall hereafter have occasion to notice at some length,\* the Himalayan ranges were first upheaved, and many climates were called into existence, requiring new creations to inhabit them, as they themselves were new.

It was for the purpose of endeavouring to elucidate this point, that I felt so anxious to obtain a passage to the Lake Chummor-ra-reel, and my disappointment may therefore be conceived, when I found the pass impracticable from the unusual depth of snow which had fallen so late in the season as the month of April, and which indeed fell again, as I witnessed, for three successive days, during the latter end of June, even so low down as Pokh in the bottom of the valley.

The clearing up of these doubts is a subject well worthy the serious attention of any naturalist who may have the means and the inclination to visit the lake in question.

On the 23d of June, we proceeded once more towards Dunkur by a most precipitous path, which wound backwards and forwards on the side of the hill in such a zig-zag manner that we were almost in a line one above another. The loose nature of the gravelly soil by no means added either to our comfort or safety, for those behind were continually showering down volleys of dust and stones upon the heads of those who were below. This descent at length brought us to the side of a brawling stream, whose waters were dashing over the precipitous rocks with headlong violence in their passage to join the Lingtee river, many hundred feet below us. At the very place where this stream was the most violent, and where it fell over the rocks in a long sheet of foam, a faint shout of many voices reached my ear above the hoarse roar of the cataract, and looking upwards, I beheld to my horror and dismay, a large fragment of rock, rolling down the side of the hill directly upon me. So hampered was I for room, with the steep crumbling hill on the one hand, and the deep chasm on the other, that I should undoubtedly have stuck fast to await the coming blow, had not a Tartar near me, with more presence of mind than gentleness, pulled me flat on my back and allowed the fragment to fly past us into

\* A Theory of the Earth.

the stream. On inquiry, it appeared that the rock had been displaced by a goat which I had that morning bought for my people, and which being refractory, a man was hauling along by a rope round its horns, and thus in the resistance and scramble of its feet it had nearly made me pay dear for my generosity. A few miles farther on brought us down to the Sangho, across the Lingtee, and on the road to Dunkur, where after a hot walk of about eight miles we halted for the night.

It is perhaps sometimes as well for us that we cannot lift the curtain and peep behind the screens, or we should leave many things undone that our ignorance of coming events prompts us to undertake; and thus it was with me, for had I been at all aware of the fatigues and discomforts which awaited me, I do not think that even my love of science would have tempted me into those bare and chilling scenes.

To describe the numerous shifts and annoyances that a traveller meets with, would be but labour lost, and after all, from him who is snugly ensconced "in his ain ingle neuk," or comfortable parlour, these would but elicit a smile, and therefore it is useless to enlarge upon them, as they must be felt, ere they can be fully appreciated. Not the least of them however is the following; every inch of level ground that can be rendered available is cultivated, and it often happens that the only spot the traveller can find on which to pitch his tent, is one on which, to judge from the deep accumulations of their dung, large flocks of sheep and goats have been folded since the days of the good old patriarch Abraham. Here then "the weary and way-worn traveller" is necessitated to pass a night of sleepless wretchedness, stifled by the stench which arises in almost perceptible fumes from the ground, and devoured by the myriads of fleas whose irritating bite effectually banishes the overtures of that sleep which is so necessary to furnish strength to meet the labours of the morning's march.

Often have I been reduced to banquet on a goat which might, for ought I know to the contrary, have been as aged as myself, and the father of a goodly progeny, strong, tough, and sinewy, as well could be; yet hunger is the best sauce, and bad as I might have thought such fare, when better was procurable, I nevertheless have managed to make a hearty meal off "sinewy Billy" and barley cakes, and blessed my stars that matters were no worse.

To recount the incidents of each day as I retraced my steps through Spiti to Hungrung and Kunawur, would be merely to repeat what has

already been written, and it will therefore suffice to say, that the same streams were waded through, and the same broken and rocky paths were traversed, till we again arrived in safety at the village of Chungo. Having halted here a couple of days to refresh my people, and also to procure specimens of the wild sheep, which abound in the neighbouring cliffs, I once more started with the intention of going to Leeo, but the Vuzeer Puttee Ram, who was now on his way back to Soongnum from the fort of Skialkur, where he had been to inspect the store of arms &c., advised me to take a passing peep at Nako, which he described as a nice cool halting place. I therefore changed my plans and marched to Nako on the heights above Leeo, Puttee Ram sending me a Ghoont to carry me up the hill. The road for the greater part of the way was the same as I had travelled over from Leeo to Chungo, when on my upward journey to Spiti; it was so stony and rugged, that I preferred trusting to my own legs rather than to those of the Ghoont, in spite of the people's assurance that he would carry me safely. The village of Nako, like all the others of these regions, is a collection of small dirty huts, with flat roofs, and built of unbaked bricks of large size, intermingled with slabs of stone, or usually, as in Spiti, of stone for the foundation, and of bricks above. There is a good deal of cultivation about it, and water is plentiful. There is a small pond of good depth near the village, on which were several Brahminee ducks.

The village boasts of two or three takoordwaras, or Lama temples, which contain a few very badly formed clay images of their gods. The people have no objection to a traveller entering their temples, which is a great convenience, as I found more than once when my tent was in the rear, after a long march. At Nako I took possession of one of them, which afforded me a cool retreat during the heat of the day.

The walls of these temples are usually daubed over on the outside with red, whilst on the inside they are painted with numerous grotesque figures of gods, men, and animals; they are generally square built, and contain one room.

The largest of the kind I saw during my journey was at the village of Tabo in Spiti, where there are three or four rooms all decorated with figures. This temple is the largest in the district, and is consequently the head quarters of the Lamas. It contains an immense collection of manuscripts, which are said to contain all the mysteries of

the Lama religion, and on certain occasions are read to all who are willing to listen. There was besides the larger rooms of images, an inner apartment in which a small lamp was burning, and into which I was requested not to set my unhallowed foot, as none but the priests themselves were allowed, except *à la distance!* to inspect what was within. It contained a small altar, placed before a god, with a brazen lamp burning on it; there were also brazen utensils of all sorts and sizes, musical instruments, such as tom-toms and cymbals and a quantity of raw ribs of meat, apparently of mutton, with which, like the jolly friars of olden times, no doubt they were wont to regale themselves.

There are a few Lamas resident at Nako, where they are zemindars. They occasionally receive presents from the brotherhood in China, of small carpets, tea cups, pieces of silk, &c. One of these men coming to pay me a visit and to show all the curious things in his possession, doubtless with a view to tempt me to become a purchaser, the conversation by some chance turned upon the subject of how Lamas were made, and who could become one. He said there were no really good Lamas either in Hungrung or Spiti, as it had become somewhat customary to make a Lama of any wealthy zemindar, who happened to have a family, while properly speaking no Lama, should either marry or have children.

I asked him if I could be made a Lama, to which he replied there could be no objection provided I would study for some months among them, and be initiated into the mysteries of their religion, with regard to the resurrection or reappearance of the Grand Lamas after death. We did not get on very satisfactorily, as the Kunawurrees who were standing by, burst into a loud laugh at my explanation of the case, which displeased the Lama and made him drop the subject.

It seems however from what he said, that when a Grand Lama dies, an inventory is made of all his effects, which are carefully sealed up until his reappearance in life to claim them.

In explanation whereof, he said, suppose a Grand Lama were to die in Chinese Tartary, his effects would be carefully guarded;—some time afterwards perhaps he might appear at Nako in Hungrung, in the form of some Lama's child.

This is known to be the new Grand Lama, from his laying claim to the sealed up effects of the deceased Grand Lama. He is then

asked what those effects consist of, and "where they are?"—and he accordingly states them one after another.

This is sometimes deemed sufficient proof; but if doubts still remain, the effects of the deceased are brought and *mixed* with other things, and the young aspirant is desired to show what are his, and what are not.

If further proof be still necessary, the child is desired to give some token that he is the Grand Lama, which he does by commanding them to carry him to some spot which he points out, and there he places his hand or his foot on a rock or large stone; when—"mirabile dictu,"—if the spirit of the Lama be really within him, the impression remains indented upon the rock ! !

This is deemed conclusive, as well it might be, and the urchin is at once proclaimed Grand Lama; presents are showered upon him from all quarters far and near, and he is carefully instructed in the rites and mysteries of his religion, and in due time proceeds to his head quarters in Chinese Tartary.

Among the rocks, but chiefly on the crumbling accumulations of debris in the neighbourhood of Nako, and even at Chungo, there is a plant found whose root is long and strikes perpendicularly downwards to some depth, the outer coat or fibres of which produce a rich and beautiful crimson dye. It is said however to be fugitive, but this may arise from ignorance of any chemical mode of fixing it. It is used by the Lamas to stain their images. The Tartars call it "khame." Behind Nako, at some distance, rises the mighty mountain called in the language of the country "Purgule," and towering aloft to a height which exceeds 20,000 feet. It derives its name from its form, the word signifying "cone-shaped or conical," hence it is applied, like the term "Kylass," to any mountain of that form.

From Nako I proceeded a short down hill march to Leeo, which is situated in the bed of the valley below, at a depth of 3,000 feet. The day was excessively hot at this place, which is completely shut in by hills rising on every side to the height of seven and eight thousand feet above it. Its crops of barley, wheat, and peas, were beautifully rich and luxuriant, and the numerous apricot trees were loaded with fruit, though as yet small and unripe. The grain is reaped at this village towards the latter end of July and beginning of August. In the district of Spiti the harvest takes place in the lower and more sheltered

situations, such as Larree, Pokh, Maness, and Dunkur, in the month of August, while in the upper parts of the valley, at Larra, Leedung, Keeoling, and Gewmil, on the heights, the grain is never ripe before the end of September and beginning of October. At the last named village it is ready about fifteen days later than at the others, which are situated on the river's banks, as might be expected from the difference in elevation, the village of Gewmil being at a height of 14,104 feet above the sea, while the others are from 12,200 to 12,500 feet.

Last year, in the month of August, the snow fell so heavily at Gewmil, that the whole crop was beaten down and destroyed. This present year of 1838, towards the end of June, the crops though healthy looking, were not more than four or five inches above the ground. It is surprising however to see with what rapidity the vegetation of the upper hills is brought to maturity. When I arrived early in June at Hungo, Leeo, and Chungo in Hungrung, their crops of barley and wheat were not more than six or seven inches in height, while on my return, three weeks afterwards, they were all in full ear, and would be ready for the reaper in July. This however is scarcely to be wondered at, when we notice the difference of temperature in that short space of time.—

At Hungo, elevation 11,413 feet by boiling point,

	<i>Sunrise.</i>	<i>Noon.</i>	<i>Sunset.</i>
10th June	41°	85°	60°
3rd July	60°	96°	64°
Difference in 23 days	19°	11	4

At Leeo, elevation 9,362 feet by boiling point,

	<i>Sunrise.</i>	<i>Noon.</i>	<i>Sunset.</i>
11th June	45°	100°	50°
2nd July	56°	110°	70°
Difference in 22 days	11	10	20

At Chungo, elevation 9,897 feet, boiling point,

	<i>Sunrise.</i>	<i>Noon.</i>	<i>Sunset.</i>
12th June	35°	82°	56°
29th June	43°	90°	69°
Difference in 17 days	12°	8	13

(*To be continued.*)